NCERT

CHAPTER WISE
TOPIC WISE

LINE BY LINE QUESTIONS
2024

BY
SCHOOL OF
EDUCATORS

NEWTON'S LAWS OF MOTION

INERTIA OF REST
The property of a body due to which it cannot change its state of rest by it self.

INERTIA OF DIRECTION
The property due to which a body cannot change its direction of motion by itself.

INERTIA OF MOTION
The tendency of a body to remain in a state of uniform motion in a straight line.

Newton's 1st law
A body continues its sate of rest or motion until unless an external force is acted on it.

$$\text{If } \vec{F}_{ext} = 0;\ \vec{a} = 0$$

Newton's 3rd law
To every action there is always on equal and opposite reaction.

$$\vec{F}_{AB} = -\vec{F}_{BA}$$

Action & Reaction act on different bodies and not on the same body. - action – reaction forces are of same type.

We cannot produce a single isolated force in nature force are always produce in action – reaction pair.

due to no time gap, any one force can be action, and other reaction.

applicable for all the interactive forces eg. Gravitational, electrostatic, electromagnetic, Tension, friction, viscous forces, etc.

For Non – inertial frame

$$\vec{F}_{ext} + \vec{F}_{Pseudo} = m\vec{a}$$

$$\vec{F}_{pseudo} = -M\vec{a}_{frame}$$

SOLVING PROBLEMS IN MECHANICS
- Draw FBD of bodies in the system.
- Choose a convenient part of the assembly as one system.
- Identify the unknown force and accelerations.
- Resolve forces into their components.

- Apply $\sum \vec{F} = m\vec{a}$ in the direction of motion.
- Apply $\sum \vec{F} = 0$ in the direction of equilibrium
- Write constraint relation if exists.
- Solve the equation $\sum \vec{F} = m\vec{a}$ & $\sum \vec{F} = 0$.

FORCES
(i) Normal Contact force

(1) always acts along the common normal of two surface in contact.
(2) Always directed towards the system.
(3) It is an electromagnetic type of force. Normal force on block is N. N = mg

Normal force
Normal=Weight
m×g

(ii) Tension Force

(1) Acts along the string and away from the system on which it acts.
(2) Tension in a massless string remains constant throughout the string if no tangential force acts along the string.
(3) This is force applied by a string on an object or force applied by one part of string on the remaining part of string.
(4) It is an electromagnetic type of force.

Newton's 2nd law
The rate of change of linear momentum of a body is directly proportional to the external force applied on the body in the direction of force.

$$\vec{F} = \frac{d\vec{p}}{dt} = m\vec{a}$$

S.I. Unit of force = Newton (N)

if m = const $\vec{F} = \frac{m d\vec{v}}{dt} = m\vec{a} \Rightarrow$ dimensional formula = $[M^1L^1T^{-2}]$

Conservation of linear momentum:- if there is no external force acting on it, total momentum of an isolated system of interacting particles is conserved

if $\vec{V} = \text{Cost} = \vec{F} = \vec{V}\frac{dm}{dt}$ convey or belt & rocket propulsion

$$\vec{F}_{ext} = 0 = \frac{d\vec{p}}{dt} \text{ or } P_{initial} = P_{final}$$

Impulse

$$\vec{I} = \vec{F}_{avg}\ \Delta t = \Delta\vec{P}$$

$$\Rightarrow I = \Delta P = \int F.dt = \text{area under } f - t \text{ curve}$$

Horizontal Circular motion (Conical Pendulum):-

$$T_{Sin\theta} = \frac{mv^2}{r} \ \&\ T_{cos\theta} = mg$$

$$V = \sqrt{rg\tan\theta}$$

Angular Speed. ω = $W = \frac{v}{r} = \sqrt{\frac{g\tan\theta}{r}}$

Time Period $T = \frac{2\pi}{w}\quad 2\pi\sqrt{\frac{r}{g\tan\theta}} = 2\pi\sqrt{\frac{L\cos\theta}{g}}$

Vertical Circular motion

1. Particle ossillates in lower half circle.
   Condition of oscillation $(0 < u \le \sqrt{2gR})$
2. Particles moves to upper half circle but not able to complete the loop. Condition of leaving the circle: $(\sqrt{2gR} < u < \sqrt{5gR})$
3. Particle completes loop. Condition of looping the loop $(u \ge \sqrt{5gR})$

MOTION OF A CAR M LEVEL ROAD (by friction only):-

$$V_{max} \le \sqrt{\mu_s Rg}$$

MOTION OF A CAR ON BANKED ROAD

(i) Optimum speed of a vehicle on a banked road. $V = \sqrt{rg\tan\theta}$

maximum safe speed on a banked frictional road. $V_{max} = \sqrt{\frac{rg(\mu + \tan\theta)}{1 - \mu\tan\theta}}$

minimum safe speed on a banked frictional road $V_{min} = \sqrt{\frac{Rg(\tan\theta - \mu)}{(1 + \mu\tan\theta)}}$

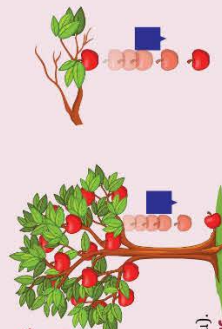
(iii) Friction Force
(1) Rolling friction:- The force of friction which comes into play when one body Ralls or tends to roll on the surface of a norther body.

(iv) Sliding friction

Resistance offered to the relative motion between the surface of two bodies in contact.

The frictional force f is directly proportional to the normal force N exerted by the surface on the body.

$(F \propto N \text{ or } f/N = \text{Constant} = \mu)$.

The friction force depends upon the nature of surfaces in contact and independent of the area of contact.

Types of friction

- **Static friction**: acts when a body is at rest on application of a force. $f_s = \mu_s N$.
- **Limiting friction**: acts when a body is just at the verge of movement. $F_l = \mu_s N$.
- **Kinetic friction**: acts when a body is actually sliding. $f_k = \mu_K N$

Circular motion

Kinematics of Uniform Circular motion
1. A particle moves in a circle at a constant speed
2. Angular displacement (θ) SI Unit: rad or degree.
3. Angular velocity (ω):

$$W_{avg} = \frac{\Delta\theta}{\Delta t}[\text{Unit. rad / sec}] \quad W_{ins} = \frac{d\theta}{dt}$$

Centripetal Force

$$F_c = ma_c = \frac{mv^2}{r} = mrw^2$$

$$\Delta S = r\Delta O \quad v = wr$$

$$\vec{V} = \vec{w} \times \vec{r}$$

$\vec{V}$ is linear velocity (tangential vector)
$\vec{w}$ (axial vector)
$\vec{r}$ = radius vector

Kinematics of Non – Uniform circular motion
Speed of the particle in a horizontal circular motion changes with respect to time.

Tangential acceleration:

$$\vec{a}_t = \vec{\alpha} \times \vec{r}$$

Centripetal force

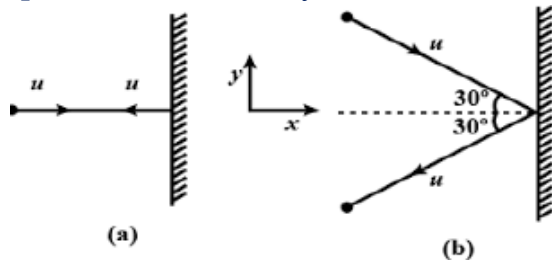
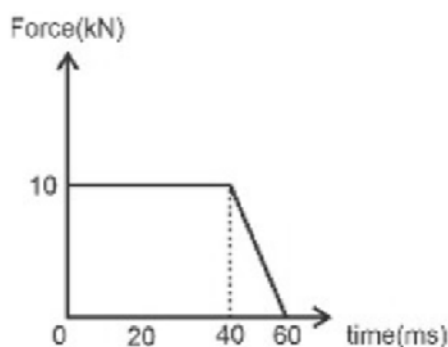
$$F_c = ma_c = \frac{mv^2}{r} = mrw^2$$

Tangential force $F_t = ma_t$

Net force $F_{net} = m\sqrt{a_c^2 + a_t^2}$

$\vec{a}_c$ responsible for change in direction of movement of particle

NCERT LINE BY LINE QUESTIONS

1. A constant retarding force 100 N is applied to a body of mass 20 kg, moving initially with speed 20 m/s. How long does the body take to stop?
(1)2s (2) 3 s (3) 1s (4) 4s
2. A man of mass 60 kg stands on a weighing scale in a lift which is moving upward with a uniform speed of 10 m/s. The reading on the scale is.
(1) Zero (2) 120kgwt (3) 60kgwt (4) 90kgwt
3. A rocket with a lift-off mass 10000 kg is blasted upwards with an initial acceleration of 2 m/s^2. The initial thrust of the blast is
(1) 120 kN (2) 80 kN (3) 100 kN (4) 140 kN
4. Consider the following statements
(a) Frictional force between block and contact surface depends on area of contact
(b) Frictional force may also act when there is no relative motion between the contact surfaces.
The correct statement is
(1) (a)only (2) (b)only
(3) (a) and (b) both (4) Neither (a) nor (b)
5. Two identical billiard balls strike a rigid wall with same speed as shown in the figure. The ratio of magnitude of impulse imparted to the balls by the wall

1) $\frac{2}{\sqrt{3}}$ 2) $\frac{1}{\sqrt{3}}$ 3) $\frac{1}{2}$ 4) $\frac{1}{3}$
6. A force-time plot for a body is shown in the figure. The total change in momentum of the body is

(1) 400 Ns (2) 300 Ns (3) 500 N s (4) 200 N s
7. For a given surface, the normal reaction and frictional force are inclined at

(1) 0°to each other (2) 90° to each other
(3) 45° to each other (4) $\tan^{-1}(\mu)$ to each other

8. A machine gun fires 10 bullets per second each with speed 200 m/s. If the mass of each bullet is 20 g, then the force required to keep the gun stationary is

(1) 40N (2) 04 N (3) 4N (4) 8N

9. A mass of 2 kg rests on a horizontal plane. The plane is gradually inclined until at an angle θ = 30° with the horizontal, the mass just begins to slide. The coefficient of static friction between the block and the surface is

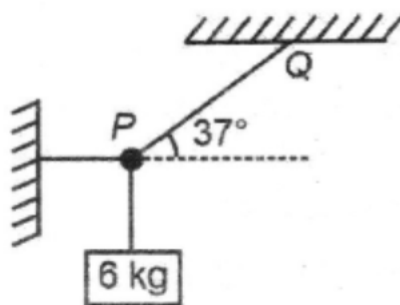
1) $\sqrt{3}$ 2) $\frac{1}{\sqrt{3}}$ 3) $\sqrt{2}$ 4) $\frac{1}{\sqrt{2}}$

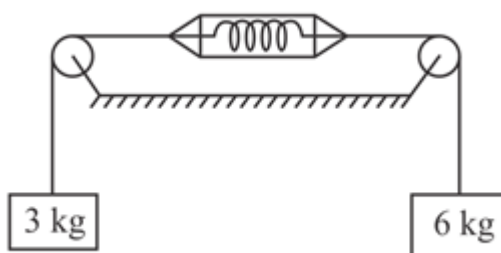
10. A cyclist speeding at 5 m/s on a level road takes a sharp circular turn of radius 2.5 m without reducing the speed. The minimum value of coefficient of static friction between tyre and road such that cyclist does not slip is

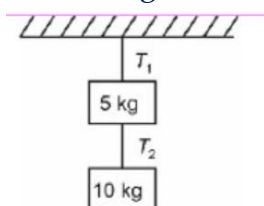
(1) 0.5 (2) 1.5 (3) 1.0 (4) 0.8

11. A truck starts from rest and accelerates uniformly with 5 m/s². The minimum value of coefficient of static friction between surface of truck and a box placed on it such that box does not slip back, will be

(1) 0.4 (2) 0.6 (3) 0.5 (4) 0.2

12. The tension in string PQ as shown in the figure is (g = 10 m/s²)

(1) 100 N (2) 150N (3) 130 N (4) 50 N

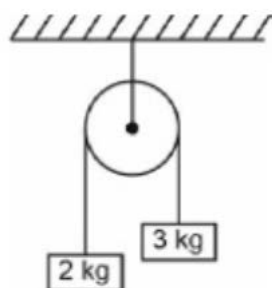
13. In the given figure, the reading of spring balance is (g = 10 m/s²)

(1) 10N (2) 20 N (3) 80 N (4) 40 N

14. The ratio of tension T_1 and T_2 as shown in the figure is

1) $\frac{3}{2}$ 2) $\frac{1}{2}$ 3) $\frac{1}{3}$ 4) $\frac{4}{3}$

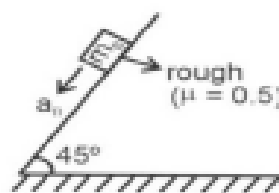
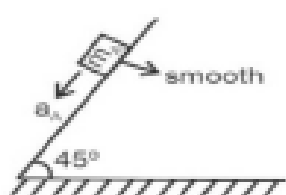
15. A car is moving on a curved road of radius *R*. The road is banked at an angle θ . The coefficient of friction between tyres of the car and road is μ . The minimum safe velocity on this road is

(1) $\sqrt{\frac{gR(\mu+\tan\theta)}{(1-\mu\tan\theta)}}$ (2) $\sqrt{\frac{gR(\tan\theta-\mu)}{(1+\mu\tan\theta)}}$

(3) $\sqrt{\frac{gR^2(\tan\theta-\mu)}{(1+\mu\tan\theta)}}$ (4) $\sqrt{\frac{gR(\tan\theta-\mu)}{(1-\mu\tan\theta)}}$

16. Two masses as shown in the figure are suspended from a smooth massless pulley. The acceleration of 3 kg mass, when system is released, will be

(1) 2.5 m/s^2 (2) 2.0 m/s^2 (3) 4.0 m/s^2 (4) 5.0 m/s^2

17. A body is acted upon by unbalanced forces, then body
(1) Will be at rest
(2) Will keep moving with uniform speed
(3) Will accelerate
(4) Will be at rest if even number of forces will act

18. Two blocks *A* and B are released from rest on two inclined plane as shown in the figure.

The ratio of the accelerations (a_A / a_B) is

(1) 1 (2) 2 (3) 1.5 (4) 0.8

19. A 60 kg monkey, climbs on a rope which can withstand a maximum tension of 900 N. The case in which the rope will break if the monkey
(1) Climbs up with acceleration of 6 m/s^2
(2) Climbs down with acceleration of 4 m/s^2
(3) Climbs up with uniform speed of 5 m/s
(4) Falls down the rope nearly freely under gravity

20. Which of the following is self adjusting force?
(1) Static friction (2) Limiting friction (3) Kinetic friction (4) All of these.

NCERT BASED PRACTICE QUESTIONS

1. The First law of motion is also called
   (a) law of inertia (b) law of gravitation
   (c) law of weak force (d) law of electrostatics

2. Inertia of a body is
   (a) Basic property of a body (b) arise due to force
   (c) due to shape of body (d) none of above

3. If two bodies A and B has mass m_A and m_B such that $m_A > m_B$ then inertia of body A is
   (a) greater then B (b) samaller then B
   (c) equal to B (d) cannot be said

4. Newton's second law of motion can be represented by
   (a) F = ma (b) F = $\frac{dp}{dt}$ (c) F = m$\frac{d\upsilon}{dt}$ (d) all above

5. Newton's law of motion are valid in
   (a) inertial frame of reference
   (b) Non inertial frame of reference
   (c) applicable to all frame of reference
   (d) Not applicable in any frame of reference

6. Every action has equal and opposite reaction is Newton's
   (a) First law (b) second law (c) third law (d) not Newton's law

7. Dimension of impulse is same as
   (a) momentum (b) force (c) energy (d) acceleration

8. A body is called in translational equilibirium when net force on the body is
   (a) zero (b) Non-zero
   (c) do not depend on force (d) variable

9. Main law of motion is
   (a) First law (b) second law (c) third law (d) none

10. If a body is acted upon by three forces $\overline{F}_1, \overline{F}_2, \overline{F}_3$ then for equilibrium of the body which condition must be correct?
    (a) $\overline{F}_1 + \overline{F}_2 + \overline{F}_3 = 0$ (b) $(\overline{F}_1) = |\overline{F}_2| = |\overline{F}_3|$ (c) $\overline{F}_1 = \overline{F}_2 + \overline{F}_3$ (d) $\overline{F}_2 = \overline{F}_1 + \overline{F}_3$

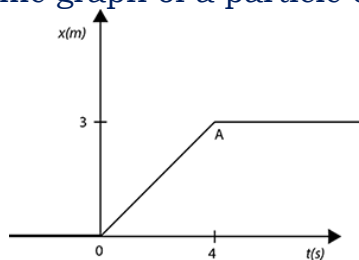
11. If u_s , u_k and u_r are coefficient of static friction, kinetic friction and rolling friction than.
    (a) $u_k > u_s > u_r$ (b) $u_s > u_r > u_k$ (c) $u_s > u_k > u_r$ (d) $u_r > u_k > u_s$

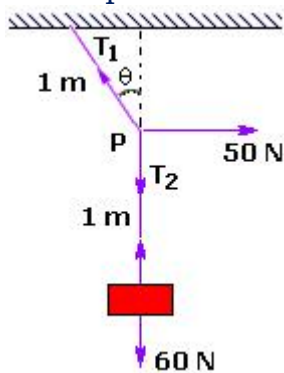
12. Two blocks are connected by a string one block is bept on friction less table then acceleration of each block is
    (a) $\frac{2m_2 g}{m_1 + m_2}$ (b) $\frac{m_2 g}{m_1 + m_2}$ (c) $\frac{m_1 g}{m_1 + m_2}$ (d) g

13. Which of the following is true for static friction force (f?)
    (a) f max $\leq \mu_s$ N (b) f max $\geq \mu_s$N
    (c) f max = o (d) f max $\geq \frac{\mu_s N}{2}$

14. Two masses 8 kg and 12kg are connected at the two ends of a light inex tensible string that goes over a friction less pulley. Then tension in the string is

(a) 96N (b) 90N (c) 85N (d) 80N

15. Figure shows the position time graph of a particle of mass 4 kg for O< t< 4s?

(a) 0 (b) ¾ N (c) 3 N (d) 4N

16. A mass of 6 kg is suspended by a rope of length 2m from the ceiling . A force of 50 N in the horizontal direction is applied at the midpoint P of the rope. What is the angel the rope makes with the vertical in equilibrium?

(a) $\tan^{-1}\left(\frac{5}{6}\right)$ (b) $\tan^{-1}\left(\frac{6}{5}\right)$

(c) $\tan^{-1}\left(\frac{1}{6}\right)$ (d) $\tan^{-1}\left(\frac{3}{4}\right)$

17. The maximum acceleration of the train in which a box lying on its floor will remain stationary coefficient of static friction between box and train's floor is 0.15

(a) 2.5 m/s^2 (b) 1.0 m/s^2

(c) 1.5 m/s^2 (d) 2.0 m/s^2

18. A batsmen deflects a ball by an angle of 45^0 without changing its initial speed which is equal to 54 km/h . What is impulse imparted to the ball (mass of the ball 0.15 kg)

(a) 2.1 kg m/s (b) 4.2 kg m/s

(c) 8.4 kg m/s (d) 5.4 kg m/s

19. A stone of mass 0.25kg tied to the end of a string is a round in a circle of radius 1.5m with a speed of 40rev/min in a horizontal pane. What is the tension in the string?

(a) 5.6 N (b) 4.6 N

(c) 6.6 N (d) 13.2N

20. A block of mass 15 kg is placed on a long trolley. The coefficient of static friction between the block and trolley is 0.18. The trolley accelerates from rest with 0.5 m/s^2 acceleration of the block with respect to trolley is

(a) 1.8 m/s^2 (b) 0.5 m/s^2
(c) 0 (d) 1.2 m/s^2

21. A shell of mass 0.02 kg is fired by a gun of mass 100kg. If the muzzle speed of the shell is 80m/s. The recoil speed of the gun is?
(a) 3.2 cm/s (b) 1.6 m/s
(c) 3.2 m/s (d) 1.6 cm/s

22. One end of a string of length l is connected to a particle of mass m and the other to a small peg on a smooth horizontal table It the particle moves in a circle with speed υ the net force on the particle is
(a) T (b) $T-\frac{m\upsilon^2}{l}$
(c) $T+\frac{m\upsilon^2}{l}$ (d) 0

23. A monkey of mass 40kg climbs on a rope which can stand a maximum tension of 600N. Then the maximum acceleration with which the monkey can climb the rope
(a) 6 cm/s (b) 5 m/s
(c) 7 m/s (d) 8 cm/s

24. Reaction due to body depends on its
(a) velocity (b) mass
(c) acceleration (d) none of these

25. A man weighing mg in a rocket moves up with acceleration 4g. His weight in the rocket is
(a) zero (b) 4mg
(c) 5 mg (d) mg

26. A shell is fired from a canon it explodes in mid air its total
(a) Momentum increases (b) Momentum decreases
(c) KE increases (d) KE decreases

27. In an elevator moving vertically up with an acceleration 'g' the force exerted on the floor by a passenger of mass M is
(a) Mg (b) $\frac{1}{2}Mg$ (c) zero (d) 2 Mg

28. A particle of mass m moving with velocity υ strikes a stationary particle of mass 2m and sticks to it. The speed of the system will be
(a) $\upsilon/2$ (b) 2υ
(c) $\upsilon/3$ (d) 3υ

29. A mass placed on an inclined plane is just in equilibirium. It μ is coefficient of friction of the surface. Then maximum inclination of the plane with the horizontal is
(a) $\tan^{-1}\mu$ (b) $\tan^{-1}(\mu/2)$
(c) $\sin^{-1}\mu$ (d) $\cos^{-1}\mu$

30. The proper use of lubricants cannot reduce
(a) static friction (b) inertia
(c) sliding friction (d) rolling friction

31. A ball with an initial momentum P collides normally with a rigid wall. If P' is its linear momentum after the perfectly elastic collision, then

(a) P’ = P (b) P’ = – P

(c) P’ = 2P (d) P’ = - 2P

32. A block of mass M is pulled along a horizontal surface by a rope of mass m by applying a force F at one end of the rope. The force which the rope exerts on the block is

(a) $\frac{FM}{m+M}$ (b) $\frac{mF}{m+M}$

(c) $\frac{mF}{M-m}$ (d) $\frac{MF}{M-m}$

33. A 60kg man goes around earth in a satellite. In the satellite, his weight will be

(a) zero (b) 60 kg (c) 600N (d) 60N

34. A bomb at rest explodes into 3 parts of the same mass the momentum of the 2 parts are – 2p $\hat{i}$ and $P\hat{j}$ the momentum of the third part will have a magnitude of

(a) P (b) $\sqrt{3P}$ (c) $P\sqrt{5}$ (d) zero

35. A body of mass 10kg is sliding on a frictionless horizontal surface with a velocity of 2 m/s. The force required to move it with the same velocity is

(a) 10 N (b) 5N (c) 20N (d) zero

36. A block of mass 2kg is pushed by a horizontal force of 2.5N on a floor. What is the force of the friction between the block and the floor if coefficient of static friction is 0.4

(a) 7.84 N (b) 8N (c) 2.5 N (d) 5N

37. A block of metal weighing 2kg is resting on a frictionless plans. If is struck by a jet releasing water at a rate of 1 kg/s and at a speed of 5m/s then acceleration of the black is:

(a) 5 m/s^2 (b) 2.5 m/s^2 (c) 7.5 m/s^2 (d) 10 m/s^2

38. A cyclist speeding at 18 km/h on a level road takes a sharp circular turn of radius 3m without reducing the speed then minimum coefficient of static friction so that cyclist do not slip?

(a) .1 (b) .83 (c) .63 (d) .53

39. Momentum conservation principle is followed when external force acting on the body or system is

(a) zero (b) non zero

(c) constant (d) do not depend on force

40. A stone of mass m tied to the end of a string revolves in a vertical circle of radius R. The net force at the lowest point of the circle is

(a) mg – T (b) mg + T

(c) mg + T $-\frac{m\upsilon^2}{R}$ (d) mg - T $-\frac{m\upsilon^2}{R}$

TOPIC WISE PRACTICE QUESTIONS

Topic 1: I, II & III Laws of Motion

1. A rider on a horse back falls forward when the horse suddenly stops. This is due to
1) inertia of horse 2) inertia of rider 3) large weight of the horse 4) losing of the balance

2. Which of the following is not an illustration of Newton's third law ?
1) Flight of a jet plane 2) A cricket player lowering his hands while catching a cricket ball
3) Walking on floor 4) Rebounding of a rubber ball

3. A particle of mass 0.3 kg subject to a force F = – kx with k =15 N/m . What will be its initial acceleration if it is released from a point 20 cm away from the origin ?
1) 15 m/s2 2) 3 m/s2 3) 10 m/s2 4) 5 m/s2

4. A ship of mass 3×10^7 kg initially at rest, is pulled by a force of 5×10^4 N through a distance of 3m. Assuming that the resistance due to water is negligible, the speed of the ship is
1) 1.5 m/sec. 2) 60 m/sec. 3) 0.1 m/sec. 4) 5 m/sec.

5. A 600 kg rocket is set for a vertical firing. If the exhaust speed is 1000 ms^{-1} , the mass of the gas ejected per second to supply the thrust needed to overcome the weight of rocket is
1) 117.6 kg s^{-1} 2) 58.6 kg s^{-1} 3) 6 kg s^{-1} 4) 76.4 kg s^{-1}

6. An object of mass 20 kg moves at a constant speed of 5 ms^{-1}. A constant force, that acts for 2 sec on the object,
gives it a speed of 3 ms^{-1} in opposite direction. The force acting on the object is
1) 8 N 2) –80 N 3) –8 N 4) 80 N

7. A satellite in a force free space sweeps stationary interplanetary dust at a rate (dM/dt) = αv. The acceleration of satellite is
1) $\frac{-2\alpha v^2}{M}$ 2) $\frac{-\alpha v^2}{M}$ 3) $\frac{-\alpha v^2}{2M}$ 4) $-\alpha v^2$

8. An object will continue moving uniformly when, the resultant force
1) on it is increasing continuously 2) is at right angles to its rotation
3) on it is zero 4) on it begins to decrease

9. A player stops a football weighting 0.5 kg which comes flying towards him with a velocity of 10m/s. If the impact lasts for 1/50th sec. and the ball bounces back with a velocity of 15 m/s, then the average force involved is
1) 250 N 2) 1250 N 3) 500 N 4) 625 N

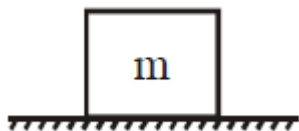
10. A ball of mass 0.2 kg is thrown vertically upwards by applying a force by hand. If the hand moves 0.2 m while applying the force and the ball goes upto 2 m height further, find the magnitude of the force. (Consider g = 10 m/s^2).
1) 4 N 2) 16 N 3) 20 N 4) 22 N

11. A block of mass 5kg is moving horizontally at a speed of 1.5 ms^{-1}. A vertically upward force 5N acts on it for 4 seconds. What will be the distance of the block from the point where the force starts acting?
1) 2 m 2) 6 m 3) 8 m 4) 10 m

12. We can derive Newton’s
1) second and third laws from the first law 2) first and second laws from the third law
3) third and first laws from the second law 4) All the three laws are independent of each other

13. A particle of mass 10 kg is moving in a straight line. If its displacement, x with time t is given by x = (t^3 – 2t – 10) m, then the force acting on it at the end of 4 seconds is
1) 24 N 2) 240 N 3) 300 N 4) 1200 N

14. A block of mass m is placed on a smooth horizontal surface as shown. The weight (mg) of the block and normal reaction (N) exerted by the surface on the block

m

1) form action-reaction pair m
2) balance each other
3) act in same direction
4) both 1) and 2)

Topic 2: Momentum, Law of Conservation of Momentum and Impulse

15. A ball of mass 150 g, moving with an acceleration 20 m/s^2, is hit by a force, which acts on it for 0.1 sec. The impulsive force is
1) 0.5 N 2) 0.1 N 3) 0.3 N 4) 1.2 N

16. A hammer weighing 3 kg strikes the head of a nail with a speed of 2 ms^{-1} drives it by l cm into the wall. The impulse imparted to the wall is
1) 6Ns 2) 3Ns 3) 2Ns 4) 12 Ns

17. A ball is thrown up at an angle with the horizontal. Then the total change of momentum by the instant it returns to ground is
1) acceleration due to gravity × total time of flight
2) weight of the ball × half the time of flight
3) weight of the ball × total time of flight
4) weight of the ball × horizontal range

18. A machine gun has a mass 5 kg. It fires 50 gram bullets at the rate of 30 bullets per minute at a speed of 400 ms^{-1}. What force is required to keep the gun in position?
1) 10 N 2) 5 N 3) 15 N 4) 30 N

19. A body whose momentum is constant must have constant
1) velocity 2) force 3) acceleration 4) All of the above

20. An object at rest in space suddenly explodes into three parts of same mass. The momentum of the two parts are $2p\,\hat{i}$ and $p\,\hat{j}$. The momentum of the third part
1) will have a magnitude $p\sqrt{3}$
2) will have a magnitude $p\sqrt{5}$
3) will have a magnitude p
4) will have a magnitude 2p.

21. A 50 kg ice skater, initially at rest, throws a 0.15 kg snowball with a speed of 35 m/s. What is the approximate recoil speed of the skater?
1) 0.10 m/s 2) 0.20 m/s 3) 0.70 m/s 4) 1.4 m/s

22. A bag of sand of mass m is suspended by a rope. A bullet of mass $\frac{m}{20}$ is fired at it with a velocity v and gets embedded into it. The velocity of the bag finally is
1) $\frac{v}{20}\times 21$ 2) $\frac{20v}{21}$ 3) $\frac{v}{20}$ 4) $\frac{v}{21}$

23. A ball of mass m falls vertically to the ground from a height h_1 and rebounds to a height h_2. The change in momentum of the ball of striking the ground is
1) $m\sqrt{2}g(h_1+h_2)$ 2) $m\sqrt{2g(m_1+m_2)}$ 3) $mg(h_1-h_2)$ 4) $m\left(\sqrt{2gh_1}-\sqrt{2gh_2}\right)$

24. A ball of mass 10 g moving perpendicular to the plane of the wall strikes it and rebounds in the same line with the same velocity. If the impulse experienced by the wall is 0.54 Ns, the velocity of the ball is
1) 27 ms^{-1} 2) 3.7 ms^{-1} 3) 54 ms^{-1} 4) 37 ms^{-1}

25. The rate of mass of the gas emitted from rear of a rocket is initially 0.1 kg/sec. If the speed of the gas relative to the rocket is 50 m/sec and mass of the rocket is 2 kg, then the acceleration of the rocket in m/sec2 is
1) 5 2) 5.2 3) 2.5 4) 25

26. The linear momentum p of a body moving in one dimension varies with time according to the equating $P = a + bt^2$ where a and b are positive constants. The net force acting on the body is
1) proportional to t^2 2) a constant 3) proportional to t 4) inversely proportional to t

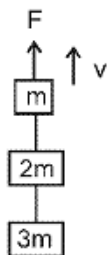
27. A balloon has 8gm of air. A small hole is pierced into it. The air escapes at a uniform rate of 7 cm^{-1}. If the balloon shrinks in 5.6 seconds then the average force acting on the balloon is:
1) 10^{-4}N 2) 10^{-2}dyne 3) 56dyne 4) 10^{-6}N

28. An object of mass 3M splits into three equal fragments. Two fragments have velocities $v\hat{j}$ and $v\hat{i}$. The velocity of the third fragment is
1) $v(\hat{j}-\hat{i})$ 2) $v(\hat{i}-\hat{j})$ 3) $v(\hat{i}+\hat{j})$ 4) $\frac{v(\hat{i}+\hat{j})}{\sqrt{2}}$

29. A shell at rest at the origin explodes into three fragments of masses 1 kg, 2 kg and m kg. The1 kg and 2 kg pieces fly off with speeds of 12 m/s along x-axis and 16 m/s along y-axis respectively. If the m kg piece flies off with a speed of 40 m/s, the total mass of the shell must be
1) 3.8 kg 2) 4 kg 3) 4.5 kg 4) 5 kg

Topic 3: Equilibrium of Forces, Motion of Connected Bodies and Pulley

30. Block A is moving with acceleration A along a frictionless horizontal surface. When a second block, B is placed on top of Block A the acceleration of the combined blocks drops to 1/5 the original value. What is the ratio of the mass of A to the mass of B?
1) 5 : 1 2) 1 : 4 3) 3 : 1 4) 2 : 1

31. Three blocks with masses m, 2 m and 3 m are connected by strings as shown in the figure. After an upward force F is applied on block m, the masses move upward at constant speed v. What is the net force on the block of mass 2m? (g is the acceleration due to gravity)

1) 2 mg 2) 3 mg 3) 6 mg 4) zero

32. Two mass m and 2m are attached with each other by a rope passing over a frictionless and massless pulley. If the pulley is accelerated upwards with an acceleration ‘a’, what is the value of tension?
1) $\frac{g+a}{3}$ 2) $\frac{g-a}{3}$ 3) $\frac{4m(g+a)}{3}$ 4) $\frac{m(g-a)}{3}$

33. A lift is moving down with acceleration *a*. A man in the lift drops a ball inside the lift. The acceleration of the ball as observed by the man in the lift and a man standing stationary on the ground are respectively
1) g, g 2) g-a, g-a 3) g-a, g 4) a, g

34. A 4000 kg lift is accelerating upwards. The tension in the supporting cable is 48000 N. If g = 10ms^{-2} then the acceleration of the lift is
1) 1 ms^{-2} 2) 2 ms^{-2} 3) 4 ms^{-2} 4) 6 ms^{-2}

35. A spring balance is attached to the ceiling of a lift. A man hangs his bag on the spring and the spring reads 49 N, when the lift is stationary. If the lift moves downward with an acceleration of 5 m/s^2, the reading of the spring balance will be
1) 24 N 2) 74 N 3) 15 N 4) 49 N

36. A triangular block of mass M with angles 30°, 60°, and 90° rests with its 30°–90° side on a horizontal table. A cubical block of mass m rests on the 60°–30° side. The acceleration which M must have relative to the table to keep m stationary relative to the triangular block assuming frictionless contact is

1) g 2) $\frac{g}{\sqrt{2}}$ 3) $\frac{g}{\sqrt{3}}$ 4) $\frac{g}{\sqrt{5}}$

37. A uniform chain of length *l* and mass *m* is hanging vertically from its ends A and B which are close together. At a given instant the end B is released. What is the tension at A when B has fallen a distance?

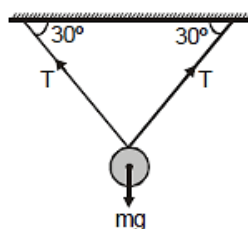
1) $\frac{mg}{2}\left[1+\frac{3x}{\ell}\right]$ 2) $mg\left[1+\frac{2x}{\ell}\right]$ 3) $\frac{mg}{2}\left[1+\frac{x}{\ell}\right]$ 4) $\frac{mg}{2}\left[1+\frac{4x}{\ell}\right]$

38. Two blocks of masses 2 kg and 1 kg are placed on a smooth horizontal table in contact with each other. A horizontal force of 3 newton is applied on the first so that the block moves with a constant acceleration. The force between the blocks would be

1) 3 newton 2) 2 newton 3) 1 newton 4) zero

39. A rope of length 4 m having mass 1.5 kg/m lying on a horizontal frictionless surface is pulled at one end by a force of 12N. What is the tension in the rope at a point 1.6 m from the other end?

1) 5N 2) 4.8N 3) 7.2N 4) 6N

40. A solid sphere of 2 kg is suspended from a horizontal beam by two supporting wires as shown in fig. Tension in each wire is approximately $\left(g=10ms^{-2}\right)$

1) 30 N 2) 20 N 3) 10 N 4) 5 N

41. A light string passing over a smooth light pulley connects two blocks of masses m_1 and m_2 (vertically). If the acceleration of the system is *g*/8, then the ratio of the masses is

1) 8 : 1 2) 9 : 7 3) 4 : 3 4) 5 : 3

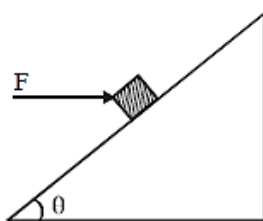
42. A block of mass *M* is pulled along a horizontal frictionless surface by a rope of mass m. If a force *P* is applied at the free end of the rope, the force exerted by the rope on the block is

1) $\frac{Pm}{M+m}$ 2) $\frac{Pm}{M-m}$ 3)P 4) $\frac{PM}{M+m}$

Topic 4: Friction

43. Consider a car moving on a straight road with a speed of 100 m/s . The distance at which car can be stopped is $\left[\mu_k=0.5\right]$

1) 1000 m 2) 800 m 3) 400 m 4) 100 m

44. A horizontal force F is applied on block of mass m placed on a rough inclined plane of inclination θ. The normal reaction N is

1) $mg\cos\theta$ 2) $mg\sin\theta$ 3) $mg\cos\theta-F\cos\theta$ 4) $mg\cos\theta+F\cos\theta$

45. A body of mass 2 kg is placed on a horizontal surface having kinetic friction 0.4 and static friction 0.5. If the force applied on the body is 2.5 N, then the frictional force acting on the body will be $\left(g=10ms^{-2}\right)$

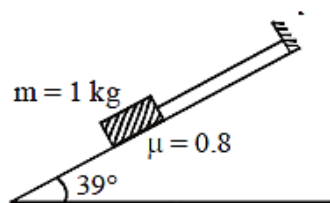
1) 8 N (2) 10 N (3) 20 N (4) 2.5 N

46. A block rests on a rough inclined plane making an angle of 30° with the horizontal. The coefficient of static friction between the block and the plane is 0.8. If the frictional force on the block is 10 N, the mass of the block (in kg) is take $\left(g = 10ms^2\right)$

1) 1.6 2) 4.0 3) 2.0 4) 2.5

47. A body starts from rest on a long inclined plane of slope 45°. The coefficient of friction between the body and the plane varies as μ =0.3xwhere *x* is distance travelled down the plane. The body will have maximum speed for $\left(g = 10ms^2\right)$ when x =

1) 9.8 m 2) 27 m 3) 12 m 4) 3.33 m

48. For the arrangement shown in the Figure the tension in the string is $\left[\text{Given}: \tan^{-1}(0.8) = 39^0\right]$

1) 6N 2) 6.4N 3) 0.4N 4) zero.

49. A 100 N force acts horizontally on a block of 10 kg placed on a horizontal rough surface of coefficient of friction $\mu = 0.5$ If the acceleration due to gravity (g) is taken as10ms^{-2}. The acceleration of the block(in ms^{-2}), the acceleration of the block (in ms^{-2}) is

(a) 2.5 (b) 10 (c) 5 (d) 7.5

50. A block of mass 0.1kg is held against a wall applying a horizontal force of 5 N on the block. If the coefficient of friction between the block and the wall is 0.5, the magnitude of the frictional force acting on the block is:

(a) 2.5 N (b) 0.98 N (c) 4.9 N (d) 0.49 N

51. A block of mass m is placed on a surface with a vertical cross section given by $y = \frac{x^3}{6}$ = If the coefficient of friction is 0.5, the maximum height above the ground at which the block can be placed without slipping is:

(a) $\frac{1}{6}$m (b) $\frac{2}{3}$m 3) $\frac{1}{3}$m 4) $\frac{1}{2}$m

52. Starting from rest, a body slides down a 45° inclined plane in twice the time it takes to slide down the same distance in the absence of friction. The coefficient of friction between the body and the inclined plane is:

(a) 0.33 (b) 0.25 (c) 0.75 (d) 0.80

Topic 5: Circular Motion and Banking of Road

53. A cane filled with water is revolved in a vertical circle of radius 4 meter and the water just does not fall down. The time period of revolution will be

(a) 1 sec (b) 10 sec (c) 8 sec (d) 4 sec

54. The coefficient of friction between the rubber tyres and the road way is 0.25. The maximum speed with which a car can be driven round a curve of radius 20 m without skidding is (g = 9.8 m/s2)

(a) 5 m/s (b) 7 m/s (c) 10 m/s (d) 14 m/s

55. A bucket tied at the end of a 1.6 m long string is whirled in a vertical circle with constant speed. What should be the minimum speed so that the water from the bucket does not spill when the bucket is at the highest position?

(a) 4 m/sec (b) 6.25 m/sec (c) 16 m/sec (d) None of the above

56. A body of mass 0.4 kg is whirled in a vertical circle making 2 rev/sec. If the radius of the circle is 1.2 m, then tension in the string when the body is at the top of the circle, is

(a) 41.56 N (b) 89.86 N (c) 109.86 N (d) 115.86 N

57. A body of mass '*m*' is tied to one end of a spring and whirled round in a horizontal plane with a constant angular velocity. The elongation in the spring is 1 cm. If the angular velocity is doubled, the elongation in the spring is 5 cm. The original length of the spring is :

(a) 15 cm (b) 12 cm (c) 16 cm (d) 10 cm

58. A person with his hands in his pockets is skating on ice at the velocity of 10 m/s and describes a circle of radius 50 m. What is his inclination with vertical

1) $\tan^{-1}\left(\frac{1}{10}\right)$ 2) $\tan^{-1}\left(\frac{3}{5}\right)$ 3) $\tan^{-1}(1)$ 4) $\tan^{-1}\left(\frac{1}{5}\right)$

59. The minimum velocity (in ms–1) with which a car driver must traverse a flat curve of radius 150 m and coefficient of friction 0.6 to avoid skidding is

(a) 60 (b) 30 (c) 15 (d) 25

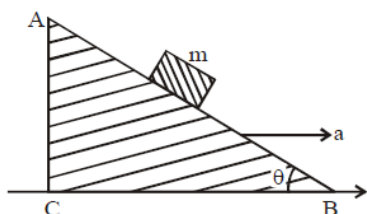
60. The string of a pendulum of length l is displaced through 90º from the vertical and released. Then the minimum strength of the string in order to withstand the tension as the pendulum passes through the mean position is

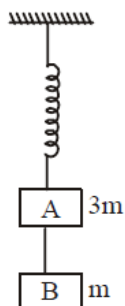
(a) 3 m g (b) 4 m g (c) 5 m g (d) 6 m g

NEET PREVIOUS YEARS QUESTIONS

1. Which one of the following statements is incorrect? **[2018]**

1) Rolling friction is smaller than sliding friction.
2) Limiting value of static friction is directly proportional to normal reaction.
3) Coefficient of sliding friction has dimensions of length.
4) Frictional force opposes the relative motion.

2. A block of mass m is placed on a smooth inclined wedge ABC of inclination q as shown in the figure. The wedge is given an acceleration 'a' towards the right. The relation between a and q for the block to remain stationary on the wedge is **[2018]**

1) $a = \frac{g}{\operatorname{cosec}\theta}$ 2) $a = \frac{g}{\sin\theta}$ 3) $a = g\tan\theta$ 4) $a = g\cos\theta$

3. Two blocks A and B of masses 3 m and m respectively are connected by a massless and inextensible string. The whole system is suspended by a massless spring as shown in figure. The magnitudes of acceleration of A and B immediately after the string is cut, are respectively : **[2017]**

1) g/3,g 2) g, g 3) g/3, g/3 4) g,g/3

4. One end of string of length l is connected to a particle of mass 'm' and the other end is connected to a small peg on a smooth horizontal table. If the particle moves in circle with speed 'v' the net force on the particle (directed towards centre) will be (T represents the tension in the string) **[2017]**

1) $T+\frac{mv^2}{1}$ 2) $T-\frac{mv^2}{1}$ 3) zero 4) T

5. What is the minimum velocity with which a body of mass m must enter a vertical loop of radius R so that it can complete the loop ? **[2016]**

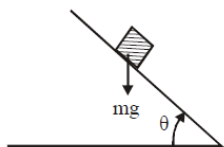
1) $\sqrt{gR}$ 2) $\sqrt{2gR}$ 3) $\sqrt{3gR}$ 4) $\sqrt{5gR}$

6. A block A of mass m_1 rests on a horizontal table. A light string connected to it passes over a frictionless pulley at the edge of table and from its other end another block B of mass m_2 is suspended. The coefficient of kinetic friction between the block and the table is μk. When the block A is sliding on the table, the tension in the string is **[2015]**

1) $\frac{(m_2-\mu k m_1)g}{(m_1+m_2)}$ 2) $\frac{m_1m_2(1+\mu_k)}{(m_1+m_2)}$ 3) $\frac{m_1m_2(1-\mu_k)g}{(m_1+m_2)}$ 4) $\frac{(m_2+\mu_k m_1)g}{(m_1+m_2)}$

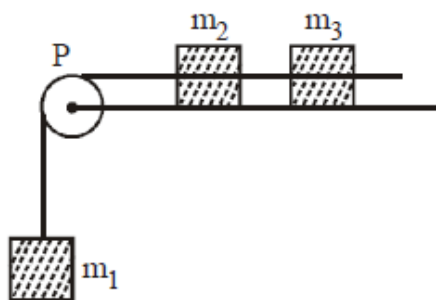
7. Three blocks A, B and C of masses 4 kg, 2 kg and 1 kg respectively, are in contact on a frictionless surface, as shown. If a force of 14 N is applied on the 4 kg block then the contact force between A and B is **[2015]**

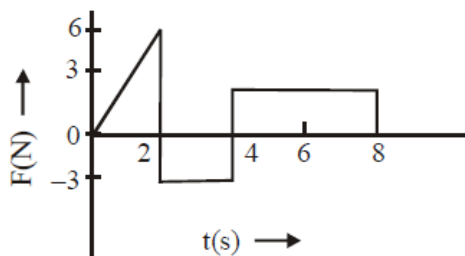
1) 6 N 2) 8 N 3) 18 N 4) 2 N

8. A plank with a box on it at one end is gradually raised about the other end. As the angle of inclination with the horizontal reaches 30º the box starts to slip and slides 4.0 m down the plank in 4.0s. The coefficients of static and kinetic friction between the box and the plank will be, respectively : **[2015]**

1) 0.6 and 0.5 2) 0.5 and 0.6 3) 0.4 and 0.3 4) 0.6 and 0.6

9. Two stones of masses m and 2 m are whirled in horizontal circles, the heavier one in radius r/2 and the lighter one in radius r. The tangential speed of lighter stone is n times that of the value of heavier stone when they experience same centripetal forces. The value of n is : **[2015]**

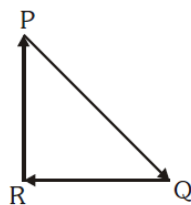
1) 3 2) 4 3) 1 4) 2

10. A system consists of three masses m_1, m_2 and m_3 connected by a string passing over a pulley P. The mass m_1 hangs freely and m_2 and m_3 are on a rough horizontal table (the coefficient of friction = μ). The pulley is frictionless and of negligible mass. The downward acceleration of mass m_1 is: (Assume $m_1 = m_2 = m_3 = m$) **[2014]**

1) $\frac{g(1-g\mu)}{g}$ 2) $\frac{2g\mu}{3}$ 3) $\frac{g(1-2\mu)}{3}$ 4) $\frac{g(1-2\mu)}{2}$

11. The force 'F' acting on a particle of mass 'm' is indicated by the force-time graph shown below. The change in momentum of the particle over the time interval from zero to 8 s is : **[2014]**

1) 24 Ns 2) 20 Ns 3) 12 Ns 4) 6 Ns

12. A balloon with mass 'm' is descending down with an acceleration 'a' (where a < g). How much mass should be removed from it so that it starts moving up with an acceleration 'a'? **[2014]**

1) $\frac{2ma}{g+a}$ 2) $\frac{2ma}{g-a}$ 3) $\frac{ma}{g+a}$ 4) $\frac{ma}{g-a}$

13. A particle moving with velocity $\vec{V}$ is acted by three forces shown by the vector triangle PQR. The velocity of the particle will : **[NEET-2019]**

(1) increase (2) decrease (3) remain constant (4) change according to the smallest force $\overline{OR}$

14. A block of mass 10 kg is in contact against the inner wall of a hollow cylindrical drum of radius 1 m. The coefficient of friction between the block and the inner wall of the cylinder is 0.1. The minimum angular velocity needed for the cylinder to keep the block stationary when the cylinder is vertical and rotating about its axis, will be : ($g = 10\ m/s^2$) **[NEET-2019]**

1) $\sqrt{10}\ rad/s$ 2) $\frac{10}{2\pi}rad/s$ 3) $10\ rad/s$ 4) $10\pi\ rad/s$

15. When an object is shot from the bottom of a long smooth inclined plane kept at an angle 60° with horizontal, it can travel a distance x_1 along the plane. But when the inclination is decreased to 30° and the same object the shot with the same velocity, it can travel x_2 distance. Then $x_1 : x_2$ will be **[NEET- 2019]**

(1) $1:\sqrt{2}$ (2) $\sqrt{2}:1$ (3) $1:\sqrt{3}$ (4) $1:2\sqrt{3}$

16. A person standing on the floor of an elevator drops a coin. The coin reaches the floor in time t_1 if the elevator is at rest and in time t_2 if the elevator is moving uniformly. Then **:- [NEET – 2019 (ODISSA)]**

(1) $t_1 < t_2$ or $t_1 > t_2$ depending upon whether the lift is going up or down

(2) $t_1 < t_2$ (3) $t_1 > t_2$ (4) $t_1 = t_2$

17. A truck is stationary and has a bob suspended by a light string, in a frame attached to the truck. The truck, suddenly moves to the right with an acceleration of a. The pendulum will **tilt** **[NEET – 2019 (ODISSA)]**

(1) to the left and angle of inclination of the pendulum with the vertical is $\sin^{-1}\left(\frac{g}{a}\right)$

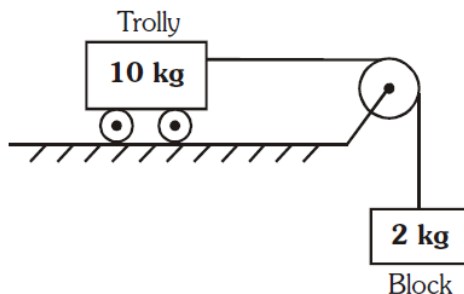
(2) to the left and angle of inclination of the pendulum with the vertical is $\tan^{-1}\left(\frac{a}{g}\right)$

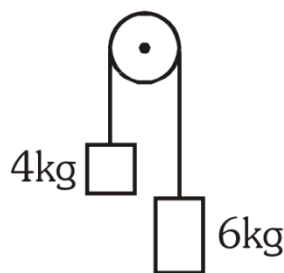
(3) to the left and angle of inclination of the pendulum with the vertical is $\sin^{-1}\left(\frac{a}{g}\right)$

(4) to the left and angle of inclination of the pendulum with the vertical is $\tan^{-1}\left(\frac{g}{a}\right)$

18. A body of mass m is kept on a rough horizontal surface (coefficient of friction = μ) A horizontal force is applied on the body, but it does not move. The resultant of normal reaction and the frictional force acting on the object is given by F, where F is : **[NEET – 2019 (ODISSA)]**

1) $|\vec{F}| = mg + \mu mg$ 2) $|\vec{F}| = \mu mg$ 3) $|\vec{F}| \le mg\sqrt{1+\mu^2}$ 4) $|\vec{F}| = mg$

19. Calculate the acceleration of the block and trolly system shown in the figure. The coefficient of kinetic friction between the trolly and the surface is 0.05. (g = 10 m/s^2, mass of the string is negligible and no other friction exists). **[NEET – 2020 (COVID-19)]**

(1) 1.25 m/s^2 (2) 1.50 m/s^2 (3) 1.66 m/s^2 (4) 1.00 m/s^2

20. Two bodies of mass 4kg and 6kg are tied to the ends of a massless string. The string passes over a pulley which is frictionless (see figure). The acceleration of the system in terms of acceleration due to gravity **[NEET – 2020]**

1) g/10 2) g 3) g/2 4) g/5

21. A ball of mass 0.15 kg is dropped from a height 10 m, strikes the ground and rebounds to the same height. The magnitude of impulse imparted to the ball is (g = 10 m/s^2) nearly **[NEET-2021]**

1) 4.2 kg m/s 2) 2.1 kg m/s 3) 1.4 kg m/s 4) 0 kg m/s

22. An electric lift with a maximum load of 2000 kg (lift + passengers) is moving up with a constant speed of 1.5 ms^{-1}. The frictional force opposing the motion is 3000N. The minimum power delivered by the motor to the lift in watts is : $\left(g = 10ms^{-1}\right)$ **[NEET-2022]**

1) 23000 2) 20000 3) 34500 4) 23500

NCERT LINE BY LINE QUESTIONS – ANSWERS

NCERT LINE BY LINE ANSWERS

1) d 2) c 3) a 4) b 5) a 6) c 7) b 8) a 9) b 10) c
11) c 12) a 13) d 14) a 15) b 16) b 17) c 18) b 19) a 20) a

NCERT BASED QUESTIONS

1) a 2) a 3) a 4) d 5) a 6) d 7) a 8) a 9) b 10) a
11) c 12) b 13) a 14) a 15) a 16) a 17) c 18) b 19) c 20) c
21) d 22) d 23) b 24) c 25) c 26) c 27) d 28) c 29) d 30) b
31) a 32) a 33) c 34) d 35) c 36) b 37 b 38) a 39) a 40) a

TOPIC WISE PRACTICE QUESTIONS - ANSWERS

1) 2	2) 2	3) 3	4) 3	5) 3	6) 2	7) 2	8) 3	9) 4	10) 4
11) 4	12) 3	13) 2	14) 2	15) 3	16) 1	17) 3	18) 1	19) 1	20) 2
21) 1	22) 1	23) 4	24) 1	25) 3	26) 3	27) 1	28) 4	29) 1	30) 2
31) 4	32) 3	33) 3	34) 2	35) 1	36) 3	37) 1	38) 3	39) 2	40) 2
41) 2	42) 4	43) 1	44) 4	45) 4	46) 3	47) 4	48) 4	49) 3	50) 2
51) 1	52) 3	53) 4	54) 2	55) 1	56) 1	57) 1	58) 4	59) 2	60) 1

NEET PREVIOUS YEARS QUESTIONS-ANSWERS

1) 3	2) 3	3) 1	4) 4	5) 4	6) 2	7) 1	8) 1	9) 4	10) 3
11) 3	12) 1	13) 3	14) 3	15) 3	16) 4	17) 2	18) 3	19) 1	20) 4
21) 1	22) 3								

TOPIC WISE PRACTICE QUESTIONS - SOLUTIONS

1. (2) Inertia is resistance to change.
2. (2) A cricketer lower his hands while catching a ball to increase the time so as to decrease the force exerted by the ball on cricketer's hands. This is not an example of Newton's third law of motion.
3. 3) Mass (m) = 0.3kg $\Rightarrow F = m.a = -15x$

$$a = -\frac{15}{0.3}x = \frac{-150}{3}x = -50x \ ; \ \ a = -50 \times 0.2 = 10 m/s^2$$

4. 3) $F = ma \Rightarrow a = \frac{F}{m} = \frac{5\times10^4}{3\times10^7} = \frac{5}{3}\times10^{-3} ms^{-2}$

Also, $v^2 - u^2 = 2as \Rightarrow v^2 - 0^2 = 2\times\frac{5}{3}\times10^{-3}\times3 = 10^{-2} \Rightarrow v = 0.1ms^{-1}$

5. 3)Thrust = $\frac{udM}{dt} = mg \Rightarrow \frac{dM}{dt} = \frac{mg}{u} = \frac{600\times10}{1000} = 6kgs^{-1}$

6. 2) Here $u = 5ms^{-1}, v = -3ms^{-1}, t = 2s, a = ?$ using $a = \frac{v-u}{t} = \frac{-3-5}{2} = -4m/s^2$

$\therefore$ Force, $F = ma = 20\times-4 = -80N$

7. 2) Thrust on the satellite, $F = \frac{-vdM}{dt} = -v(\alpha v) = -\alpha v^2$; Acceleration = $\frac{F}{M} = \frac{-\alpha v^2}{M}$

8. 3) The body will continue accelerating until the resultant force acting on the body becomes zero

9. 4) Here m = 0.5kg; u -10m/s; t = 1/50s; v = +15ms^{-1}

Force = m(v-u)/t=0.5(10+15) $\times$50=625N

10. 4)

Mass ,m = 0.2kg

Total height, h = 0.2 + 2 = 2.2m

Work done =Difference in potential energy.

F.S = mgh where S is the distance for ehich the force is applied by hand,

S = 0.2m

$$F = \frac{mgh}{S} = \frac{0.2\times10\times2.2}{0.2}$$

F = 22N

11. 4)

Assume initial velocity of 1.5 m/s is in the x-direction

Since there are no forces on it in this direction, there will be no acceleration.

So, distance $S_x = 1.5\times4 = 6m$

In the y-direction, F = 5N and m = 5kg

Acceleration in y=direction,

$$a_y = \frac{F}{m} = \frac{5}{5} = 1m/s^2$$

$$S_y = \frac{1}{2}a_y t^2 = \frac{1}{2}\times1\times4^2 = 8m$$

Resolving the x and y vector we get,

$S^2 = S_x^2 + S_y^2$

$S^2 = 6^2 + 8^2$

$S = \sqrt{36+64}$

$S = \sqrt{100}$

S = 10m

12. 3) From Newton's second law, $F=\frac{dp}{dt}=m\frac{dv}{dt}$

When the external force is zero, $m\frac{dv}{dt}=0$

or v = constant, this is Newton's first law of motion. That is if the net force acting on the system of mass is zero. Then, the velocity of the system remains constant. Let two objects moving with momentum p_1 and p_2 respectively. Thus, net momentum, p = p_1+p_2 If the total momentum is constant , then $\frac{dp}{dt}=0$ or $\frac{dp_1}{dt}+\frac{dp_2}{dt}=0$

Thus, $F_1+F_2 = 0$ or $F_1= -\mathbf{F}_2$, this is the third law.

13. 2) m = 10kg, $x=\left(t^3-2t-10\right)m$

$\frac{dx}{dt}=v=3t^2-2$ $\frac{d^2x}{dt^2}=a=6t$

At the end of 4 seconds, a = $6\times 4=24m/s^2$

$F=ma=10\times 24=240N$ because F_1 is equal to the vector sum of F_2 & F_3

14. 2) Balance each other
mg and N cannot form action - reaction pair as they are acting on same body. They balance each other to keep the block at rest.

15. 3) $Mass=150gm=\frac{150}{1000}kg$

$Force=Mass\times acceleration=\frac{150}{1000}\times 20N=3N$

Impulsive force $=F.\Delta t=3\times 0.1=0.3N$

16. 1) As we know, $|impulse|=|change\ in\ momentum|=|p_2-p_1|=|0-mv_1|=|0-3\times 2|=6Ns$

17. 3) Change in momentum of the ball

$=mv\sin\theta-\left(-mv\sin\theta\right)=2mv\sin\theta=mg\times\frac{2v\sin\theta}{g}=$ weight of the ball $\times$ total time of flight

18. 1) Force required = $\frac{change\ in\ momentum}{time\ taken}=\frac{\left(50\times 10^{-3}\times 30\right)\times 400-\left(5\times 0\right)}{60}=10N$

19. 1) For a given mass $P\propto V$ If the momentum is constant then its velocity must be constant.

20. 2) Total momentum = $2p\hat{i}+p\hat{j}$ Magnitude of total momentum = $\sqrt{\left(2p\right)^2+p^2}=\sqrt{5p^2}=\sqrt{5}p$

This must be equal to the momentum of the third part.

21. 1) $P_{skater}+P_{snowball}=0$ $=\frac{-\left(0.15kg\right)\left(35m/s\right)}{\left(50kg\right)}=-0.10m/s$

The negative sign indicates that the momenta of the skater and the snowball are in opposite directions

22. 1) $\frac{m}{20}v=\left(m+\frac{m}{20}\right)V=\frac{21}{20}mV$

23. 4) Let v_1 = velocity when height of free fall is h_1

$v_2=$ velocity when height of free rise is h_2

$\therefore v_1^2=u^2+2gh_1$ for free fall or For free rise after impact on ground

$0=v_2^2-2gh_2$ or $v_2^2=2gh_2$

Initial momentum = mv1

Final momentum = mv2

$\therefore$ Change in momentum = $m(v_1 - v_2) = m\left(\sqrt{2gh_1} - \sqrt{2gh_2}\right)$

24. 1) As the ball, m = 10 g = 0.01 kg rebounds after striking the wall

$\therefore$ Change in momentum = *mv* – (–*mv*) = 2 *mv*

Inpulse = Change in momentum = 2*mv*

$$\therefore v = \frac{\text{Im pulse}}{2m} = \frac{0.54\text{Ns}}{2 \times 0.01\text{kg}} = 27\text{ms}^{-1}$$

25. 3) $\frac{dM}{dt} = 0.1\text{kg/s}, v_{gas} = 50\text{m/s}$

Mass of the rocket = 2 kg. Mv = constant

$$-v\frac{dM}{dt} + M\frac{dv}{dt} = 0$$

$$\therefore \frac{dv}{dt} = \frac{1}{M}v\frac{dM}{dt} \Rightarrow \text{acceleration} = \frac{1}{2} \times 50 \times 0.1 = 2.5\text{m/s}^2$$

26. 3)

Given, $p = a + bt^2$

$$\frac{dp}{dt} = 2bt$$

$$\because \quad F = \frac{dp}{dt}$$

$$\therefore \quad F = 2bt$$

or $F \propto t$

27. 1) Force acting on the ballon,

$$F = 7 \times \frac{8}{5.6} = 10\text{dynes} = 10^{-4}\text{N}$$

28. 4) Applying law of conservation of momentum

$$Mv_3 = Mv\frac{(\hat{i} + \hat{j})}{\sqrt{1^2 + 1^2}} \Rightarrow v_3 = v\frac{(\hat{i} + \hat{j})}{\sqrt{2}}$$

29. 1)

Initial momenut of the system $\vec{P} = 0$

Final momentum $= \vec{P}_1\vec{P}_2 + \vec{P}_3$

By the law of conservation of momentum br> $\vec{P} = \vec{P}_1 + \vec{P}_2 + \vec{P}_3$ or $, 0 = \vec{P}_1 + \vec{P}_2 + \vec{P}_3$ or $, \vec{P}_1 + \vec{P}_2 = -\vec{P}_3$

Thus the magnitude of $(\vec{P}_1 + \vec{P}_2)$ will be equal to the magnitude of $\vec{P}_3$

$$\left|\vec{P}_1 \times \vec{P}_2)\right| = \sqrt{P_1^2 + P_2^2} = \sqrt{(2 \times 12)^2 + (2 \times 16)^2} = 34$$

$$\left|\vec{P} + \vec{P}_1\right| = \left|\vec{P}_3\right|$$

$= 34 = 40m$ or $, m = 0.8kg$

So the total m ass of the sell $= 1 + 2 + 0.9 = 3.8kg$

30. 2) Apply Newton's second law

$F_A = f_{AB}$, therefore:

$m_A a_A = (m_A + m_B)a_{AB}$ and $a_{AB} = a_A / 5$

Therefore: $m_A a_A = (m_A + m_B)a_A / 5$ which reduces to

$4m_A = m_B$ or $1:4$

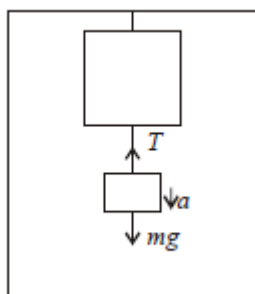
31. 4) $\because v = \text{cons tan t}$

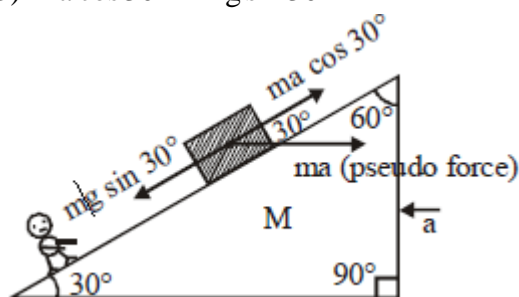
So, $a = 0$, Hence, $F_{net} = ma = 0$

32. 3) The equations of motion are $2mg - T = 2ma$
$T - mg = ma \Rightarrow T = 4ma$ & $a = g/3$ so $T = 4mg/3$
If pulley is accelerated upwards with an accleration a, then tension in string is
$$T = \frac{4m}{3}(g+a)$$

33. 3) For the man standing in the left, the acceleration of the ball $\vec{a}_{bm} = \vec{a}_b - \vec{a}_m \Rightarrow a_{bm} = g - a$
Where 'a' is the acceleration of the mass (because the acceleration of the lift is 'a')
For the man standing on the ground, the acceleration of the ball
$\vec{a}_{bm} = \vec{a}_b - \vec{a}_m \Rightarrow a_{bm} = g - 0 = g$

34. 2) $T = m(g+a)$
$48000 = 4000(10+a) \Rightarrow a = 2ms^{-2}$

35. 1) For the bag accelerating down
$mg - T = ma$

$$\therefore T = m(g-a) = \frac{49}{10}(10-5) = 24.5N$$

36. 3) $ma\cos 30^0 = mg\sin 30^0$

$$\therefore a = \frac{g}{\sqrt{3}}$$

37. 1)

Let the chain fall through distance 'dn' in the time 'Δt'

initial momentum of $\frac{dx}{2}$ part going towards end A of the chain

$= \left(\frac{dx}{2}\right)\left(\frac{W}{Lg}\right)v$

Now as the chain has slanted falling freely

$v = \sqrt{2g\left(\frac{dx}{2}\right)}$

final momentum as the = 0 (as the chain stops waning as it woven on the A end)

Change in momentum $= \left(\frac{dx}{2}\right)\left(\frac{W}{Lg}\right)v$

As all this happens in Δt time

force $= \left(\frac{W}{Lg}\right)\left(\frac{dx}{2\Delta t}\right)v$

$= \frac{W}{Lg}\left(v^2\right)$

This in the force due to change in momentum at the end of the chain attached at point A.

force due to weight of $\frac{dx}{2} = \frac{W}{L}\frac{dx}{2}$

Total force due to $\left(\frac{dx}{2}\right)$ length $= \frac{W}{L}\frac{dx}{2} + \frac{W}{Lg}v^2$

$= \frac{W}{L}\frac{dx}{2} + \frac{W}{Lg}dx$

$\frac{3}{2}\frac{W}{L}dx$

Now weight due to initially hanging $\frac{L}{2}$ length of chain

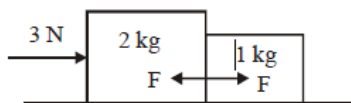
$= \frac{W}{L}\left(\frac{L}{2}\right)$

Total force =Total weight

$\frac{W}{L}\left(\frac{L}{2}\right) + \frac{3}{2}\frac{W}{L}dx$

for 'x' length of fall $f_{total} = \frac{W}{L}\left(\frac{L}{2}\right) + \frac{3}{2}\frac{3}{2}\frac{W}{L}x$

$\rightarrow f_{total} = \frac{W}{2}\left(1 + \frac{3x}{L}\right)$

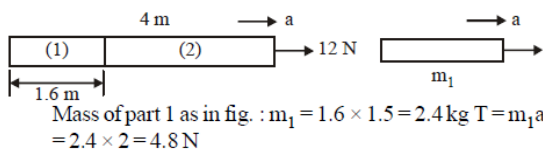
38. 3) See fig. Let F be the force between the blocks and a their common acceleration. Then for 2 kg block,

$3 - F = 2a$ ...(1)

for 1 kg block, $F = 1 \times a = a$ ...(2)

$\therefore 3 - F = 2F$ or $3F = 3$ or $F = 1$ newton

39. 2) As in fig. the mass of the rope : $m = 4 \times 1.5 = 6kg$

Acceleration : a = 12/6 = $2 m/s^2$

Mass of part 1 as in fig. : $m_1 = 1.6 \times 1.5 = 2.4\,kg$ $T = m_1 a$
$= 2.4 \times 2 = 4.8\,N$

40. 2) $2T\cos 60^0 = mg$ or $T = mg = 2 \times 10 = 20N$

41. 2)

For mass m1

$m_1 g - T = m_1 a$

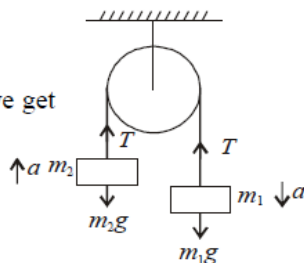
For mass m2

$T - m_2 g = m_2 a$

Adding the equations we get

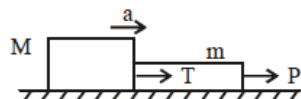
$$a = \frac{(m_1 - m_2)g}{m_1 + m_2}$$

Here $a = \frac{g}{8}$

$$\therefore \frac{1}{8} = \frac{\frac{m_1}{m_2} - 1}{\frac{m_1}{m_2} + 1} \Rightarrow \frac{m_1}{m_2} + 1 = 8\frac{m_1}{m_2} - 8 \Rightarrow \frac{m_1}{m_2} = \frac{9}{7}$$

42. 4)

Taking the rope and the block as a system

we get $P = (m + M)\,a$

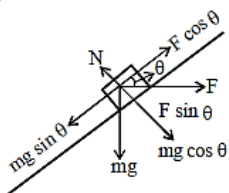
$$\therefore a = \frac{P}{m+M}$$

Taking the block as a system,

we get $T = Ma$ $\quad \therefore T = \frac{MP}{m+M}$

43. 1) $v^2 - u^2 = 2as$ or $0^2 - u^2 = 2(-\mu kg)s$

$$-100^2 = 2 \times -\frac{1}{2} \times 10 \times s$$

$s = 1000m$

44. 4)

From figure $N = mg\cos\theta + F\sin\theta$

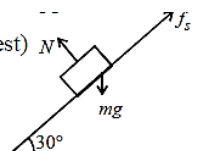
45. 4) Limiting friction= $0.5 \times 2 \times 10 = 10N$

The applied force is less than force of friction, therefore the force of friction is equal to the applied force.

46. 3)

$mg\sin\theta = f_s$ (for body to be at rest)

$\Rightarrow m \times 10 \times \sin 30° = 10$

$\Rightarrow m \times 5 = 10 \Rightarrow m = 2.0\ kg$

47. 4) When the body has maximum speed then

$\mu = 0.3x = \tan 45^0 \therefore x = 3.33m$

48. 4) Here $\tan\theta = 0.8$

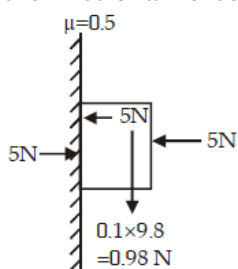
Where θ is angle of repose

$\theta = \tan^{-1}(0.8) = 39^0$

The given angle of inclination is equal to the angle of repose. So the 1 kg block has no tendency to move.

$\therefore mg\sin\theta = \text{force of friction} \Rightarrow T = 0$

49. 3) $a = \dfrac{F - \mu R}{m} = \dfrac{100 - 0.5\times(10\times10)}{10} = 5ms^{-2}s$

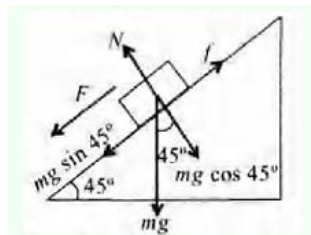
50. 2) The magnitude of the frictional force f has to balance the weight 0.98 N acting downwards. Therefore the frictional force = 0.98 N

51. 1) At limiting equilibrium, $\mu = \tan\theta$

$\tan\theta = \mu = \dfrac{dy}{dx} = \dfrac{x^2}{2}(\text{from question})$

$\because$ Coefficient of friction $\mu = 0.5$

$\therefore 0.5 = \dfrac{x^2}{2} \Rightarrow x = \pm 1$

Now, $y = \dfrac{x^3}{6} = \dfrac{1}{6}m$

52. 3) The various forces acting on the body have been shown in the figure. The force on the body down the inclined plane in presence of friction μ is

$F = mgsin\theta - f = mgsin\theta - \mu N = ma$

or $a = gsin\theta - \mu gcos\theta$.

Since block is at rest thus initial velocity u = 0

$\therefore$ Time taken to slide down the plane

$t_1 = \sqrt{\frac{2s}{a}} = \sqrt{\frac{2s}{g\sin\theta - \mu g\cos\theta}}$

In absence of friction time taken will be $t_2 = \sqrt{\frac{2s}{g\sin\theta}}$

Given : $t_1 = 2t_2$.

$\therefore t_1^2 = 4t_2^2$ or $\frac{2s}{g(\sin\theta - \mu\cos\theta)} = \frac{2s\times4}{g(\sin\theta)}$

or $\sin\theta = 4\sin\theta - 4\mu\cos\theta$ or $\mu = \frac{3}{4}\tan\theta = 0.75$

53. 4) The speed at the highest point must be $v \ge \sqrt{rg}$

Now $v = r\omega = r(2\pi/T)$

$\therefore r(2\pi/T) > \sqrt{rg}$ or $T < \frac{2\pi r}{\sqrt{rg}} < 2\pi\sqrt{\left(\frac{r}{g}\right)}$

$\therefore T = 2\pi\sqrt{\left(\frac{4}{9.8}\right)} = 4\,\text{sec}$

54. 2) $\mu mg = mv^2/r$ or $v = \sqrt{\mu gr}$ or $v = \sqrt{(0.25\times9.8\times20)} = 7\,m/s$

55. 1) Since water does not fall down, therefore the velocity of revolution should be just sufficient to provide centripetal acceleration at the top of vertical circle. So, $v = \sqrt{(gr)} = \sqrt{\{10\times(1.6)\}} = \sqrt{(16)} = 4\,m/sec$

56. 1) Given: Mass(m) = 0.4kg
It frequency (n) = 2rev/sec
Radius (r) = 1.2m. we know that linear velocity of the body (v) = $\omega t = (2\pi n)r = 2\times3.14\times1.2\times2 = 15.08\,m/s$
Therefore, tension in the string when the body is at the top of the circle (T)

$= \frac{mv^2}{r} - mg = \frac{0.4\times(15.08)^2}{2} - (0.4\times9.8) = 45.78 - 3.92 = 41.56N$

57. 1)

Given,

Centrifugal force will stretch the string

$m(l+1)\omega^2 = kx$

At elongation $(x = 1)$

$m(l+1)\omega^2 = k \times 1$ ......(1)

At elongation $(x = 5)$

$m(l+5)(2\omega)^2 = K \times 5$ ...... (2)

From (1) and (2)

$l = 15$ cm

58. 4) The inclination of person from vertical is given by

$\tan\theta = \frac{v^2}{rg} = \frac{(10)^2}{50\times10} = \frac{1}{5} \therefore \theta = \tan^{-1}(1/5)$

59. 2) For negotiating a circular curve on a levelled road, the maximum velocity of the car is $v_{max} = \sqrt{\mu rg}$ Here $\mu = 0.6, r = 150m, g = 9.8$

$\therefore v_{max} = \sqrt{0.6\times150\times9.8} \approx 30m/s$

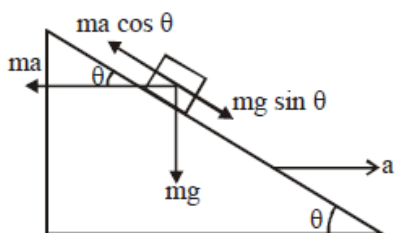
60. 1) The velocity at the lowest point is given by v = $\sqrt{(2gr)}$ Further, $T - mg = \frac{mv^2}{r}$ (at lowest point)

$\therefore T = mg + \frac{mv^2}{r} = mg + \frac{m(2gr)}{r} = mg + 2mg = 3mg$

NEET PREVIOUS YEARS QUESTIONS-SOLUTIONS

1. 3) Coefficient of friction or sliding friction has no dimension

$f = \mu_s N \Rightarrow \mu_s = \frac{f}{N}$

2. 3) Let the mass of block is m. It will remains stationary if forces acting on it are in equilibrium. i.e., ma cos $\theta = mg\sin\theta \Rightarrow a = g\tan\theta$

Here ma = Pseudo force on block, mg = weight.

3. 1)

Before cutting the strip

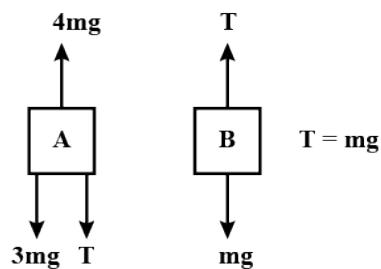
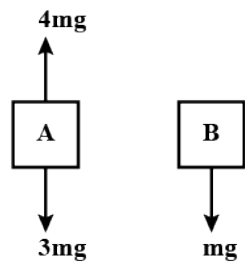
$T = mg$

after cutting the strip

$$a_A = \frac{4mg - 3mg}{3m} = \frac{mg}{3m} = \frac{g}{3}$$

$$a_B = \frac{mg}{m} = g$$

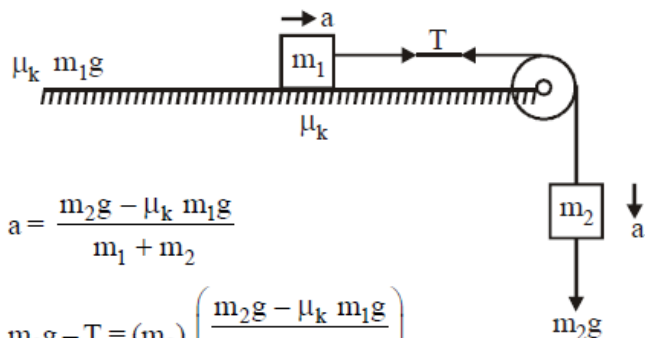
$\frac{g}{3} : g.$

Before cutting the strip

after cutting the strip

4. 4) Net force on particle in uniform circular motion is centripetal force $\left(\frac{mv^2}{l}\right)$ which is provided by tension in string so the net force will be equal to tension i.e., T.

5. 4) To complete the loop a body must enter a vertical loop of radius R with the minimum velocity $v = \sqrt{5gR}$

6. 2) For the motion of both the blocks

$m_1 a = T - \mu_k m_1 g$

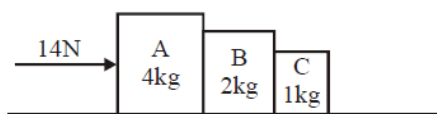
$m_2 g - T = m_2 a$

$$a = \frac{m_2g - \mu_k\ m_1g}{m_1 + m_2}$$

$$m_2g - T = (m_2)\left(\frac{m_2g - \mu_k\ m_1g}{m_1 + m_2}\right)$$

solving we get tension in the string

$$T = \frac{m_1m_2g\,(1+\mu_k)\,g}{m_1 + m_2}$$

7. 1) Acceleration of system $a = \frac{F_{net}}{M_{total}} = \frac{14}{4+2+1} = \frac{14}{7} = 2m/s^2$

14N | A 4kg | B 2kg | C 1kg

The contact force between A and B $= (m_B + m_C) \times a = (2+1) \times 2 = 6N$

8. 1)

Static coefficient of friction is $\mu_s = \tan 30° = 0.577 \approx 0.6$

For kinetic friction, $ma = mg\sin 30 - f = mg\sin 30 - \mu_k mg\cos 30$

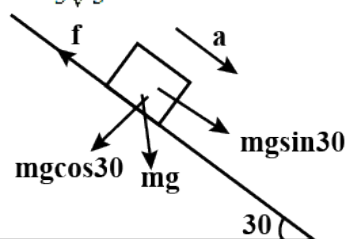
$$a = g\sin 30 - \mu_k g\cos 30 \ldots(1)$$

and also using $S = ut + 1/2at^2$,

$$\Rightarrow 4 = 0 + (1/2)a(4)^2$$

$$\text{or } a = 0.5m/s^2$$

Now from (1) we get, $0.5 = 10(1/2) - \mu_k(10)(\frac{\sqrt{3}}{2})$

or $\mu_k = \frac{4.5}{5\sqrt{3}} = 0.5$

9. 4) According to question, two stones experience same centripetal force

i.e. $F_{C1} = F_{C2}$ or, $\frac{mv_1^2}{r} = \frac{2mv_2^2}{(r/2)}$ or, $V_1^2 = 4V_2^2$ so, $V_1 = 2V_2$ i.e., $n = 2$

10. Acceleration $= \dfrac{\text{net force in the direction of motion}}{\text{Total mass of system}} = \dfrac{m_1 g - \mu(m_2 + m_3)g}{m_1 + m_2 + m_3} = \dfrac{g}{3}(1 - 2\mu)$

$(\because m_1 = m_2 = m_3 = m \text{ given})$

11. 3) Change in momentum,

$\Delta p = \int F dt = \text{Area of } F - t \text{ graph} = \text{ar of } \Delta - \text{ar of } \square + \text{ar of } \square = \frac{1}{2} \times 2 \times 6 - 3 \times 2 + 4 \times 3 = 12 N - s$

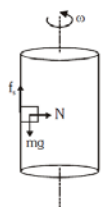
12. 1) Let upthrust of air be Fa then
For downward motion of balloon
Fa = mg – ma
mg – Fa = ma
For upward motion
Fa – (m – Δm)g = (m – Δm)a
Therefore Δm = 2ma/g+a

13. 3)

$\vec{F}_{net} = \vec{F}_1 + \vec{F}_2 + \vec{F}_3 = \vec{0}$

$\Rightarrow \vec{a} = 0$

$\Rightarrow \vec{v} = \text{constant}$

14. 3) $f_L = \mu N = \mu m r \omega^2$

$f_s = mg$

$As \;\; f_s \le f_L$

$\Rightarrow mg \le \mu m r \omega^2 \Rightarrow \omega \ge \sqrt{\dfrac{g}{\mu r}}$

$\Rightarrow \omega_{min} = 10 rad/s$

15. 3) $v^2 = u^2 - 2as$

$\Rightarrow \;\; s = \dfrac{u^2}{2a} = \dfrac{u^2}{2g\sin\theta}$

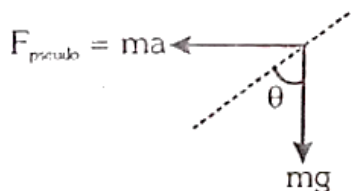
$\dfrac{x_1}{x_2} = \dfrac{\sin\theta_2}{\sin\theta_1} = \dfrac{\sin 30^\circ}{\sin 60^\circ} = \dfrac{1/2}{\sqrt{3}/2} \Rightarrow \dfrac{x_1}{x_2} = \dfrac{1}{\sqrt{3}}$

16. 4) As the elevator is moving at uniform speed, so it's acceleration is zero, so, no pseudo force. Thus it can not affect the motion of the coin. Thus in both cases, the coin takes the same time. i.e, t1= t2

17. 2)

$F_{pseudo} = ma$

θ

mg

$tan\,\theta = \frac{F_{pseudo}}{mg} = \frac{a}{g}$ towards left

18. 3)

If R is normal reaction,

Maximum force by surface when friction work

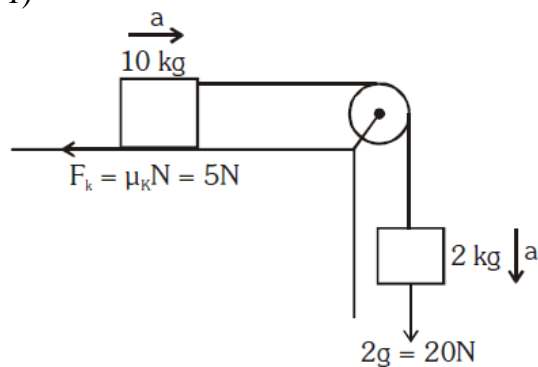
$F = \sqrt{f^2 + R^2} = \sqrt{\mu R^2 + R^2} \quad (\because f = \mu R)$

$= R\sqrt{\mu^2 + 1}$

Maximum force = R, when there is no friction.

Hence, ranging from R to $R\sqrt{\mu^2 + 1}$

we get $Mg \le f \le mg\sqrt{\mu^2 + 1}$

19. 1)

$a = \frac{\text{net force}}{\text{total mass}} = \frac{20-5}{12} = 1.25\,m/s^2$

20. 4)

$a = \frac{(m_2 - m_1)g}{m_2 + m_1} = \frac{(6-4)g}{6+4} = \frac{g}{5}$

21. 1)Given that :

Mass of ball = 0.15 kg

Height from which ball is dropped = 10 m

Impulse, $\vec{I}$ = Change in linear momentum = $= \Delta\overline{P} = \overline{P_f} - \overline{P_i}$

Velocity of ball at ground (v) $= \sqrt{2gh} = \sqrt{2\times10\times10} = 10\sqrt{2}\,m/s$

$\vec{I} = 0.15\times10\sqrt{2}(-\hat{j}) - 0.15\times10\sqrt{2}(\hat{j})$

$\vec{I} = 2\times0.15\times10\sqrt{2}(-\hat{j}) = 4.2(-\hat{j})$

magnitude of impulse = 4.2 kg m/s

22. $P = (mg + F)V$

$= (20000 + 3000)\times1.5 = 34500$

JOIN OUR WHATSAPP GROUPS

FOR FREE EDUCATIONAL RESOURCES

JOIN SCHOOL OF EDUCATORS WHATSAPP GROUPS FOR FREE EDUCATIONAL RESOURCES

We are thrilled to introduce the School of Educators WhatsApp Group, a platform designed exclusively for educators to enhance your teaching & Learning experience and learning outcomes. Here are some of the key benefits you can expect from joining our group:

BENEFITS OF SOE WHATSAPP GROUPS

- **Abundance of Content:** Members gain access to an extensive repository of educational materials tailored to their class level. This includes various formats such as PDFs, Word files, PowerPoint presentations, lesson plans, worksheets, practical tips, viva questions, reference books, smart content, curriculum details, syllabus, marking schemes, exam patterns, and blueprints. This rich assortment of resources enhances teaching and learning experiences.

- **Immediate Doubt Resolution:** The group facilitates quick clarification of doubts. Members can seek assistance by sending messages, and experts promptly respond to queries. This real-time interaction fosters a supportive learning environment where educators and students can exchange knowledge and address concerns effectively.

- **Access to Previous Years' Question Papers and Topper Answers:** The group provides access to previous years' question papers (PYQ) and exemplary answer scripts of toppers. This resource is invaluable for exam preparation, allowing individuals to familiarize themselves with the exam format, gain insights into scoring techniques, and enhance their performance in assessments.

- **Free and Unlimited Resources:** Members enjoy the benefit of accessing an array of educational resources without any cost restrictions. Whether its study materials, teaching aids, or assessment tools, the group offers an abundance of resources tailored to individual needs. This accessibility ensures that educators and students have ample support in their academic endeavors without financial constraints.

- **Instant Access to Educational Content:** SOE WhatsApp groups are a platform where teachers can access a wide range of educational content instantly. This includes study materials, notes, sample papers, reference materials, and relevant links shared by group members and moderators.

- **Timely Updates and Reminders:** SOE WhatsApp groups serve as a source of timely updates and reminders about important dates, exam schedules, syllabus changes, and academic events. Teachers can stay informed and well-prepared for upcoming assessments and activities.

- **Interactive Learning Environment:** Teachers can engage in discussions, ask questions, and seek clarifications within the group, creating an interactive learning environment. This fosters collaboration, peer learning, and knowledge sharing among group members, enhancing understanding and retention of concepts.

- **Access to Expert Guidance:** SOE WhatsApp groups are moderated by subject matter experts, teachers, or experienced educators can benefit from their guidance, expertise, and insights on various academic topics, exam strategies, and study techniques.

Join the School of Educators WhatsApp Group today and unlock a world of resources, support, and collaboration to take your teaching to new heights. To join, simply click on the group links provided below or send a message to +91-95208-77777 expressing your interest.

Together, let's empower ourselves & Our Students and inspire the next generation of learners.

Best Regards,
Team
School of Educators

Subject Wise Secondary and Senior Secondary Groups (IX & X For Teachers Only)

Secondary Groups (IX & X)

Senior Secondary Groups (XI & XII For Teachers Only)

Subject Wise Secondary and Senior Secondary Groups (IX & X For Students Only)

Secondary Groups (IX & X)

Senior Secondary Groups (XI & XII For Students Only)

Groups Rules & Regulations:

To maximize the benefits of these WhatsApp groups, follow these guidelines:

1. Share your valuable resources with the group.
2. Help your fellow educators by answering their queries.
3. Watch and engage with shared videos in the group.
4. Distribute WhatsApp group resources among your students.
5. Encourage your colleagues to join these groups.

Additional notes:

1. Avoid posting messages between 9 PM and 7 AM.
2. After sharing resources with students, consider deleting outdated data if necessary.
3. It's a NO Nuisance groups, single nuisance and you will be removed.

- No introductions.
- No greetings or wish messages.
- No personal chats or messages.
- No spam. Or voice calls
- Share and seek learning resources only.

Please only share and request learning resources. For assistance, contact the helpline via WhatsApp: +91-95208-77777.

SKILL MODULES BEING OFFERED IN MIDDLE SCHOOL

Artificial Intelligence

Beauty & Wellness

Design Thinking & Innovation

Financial Literacy

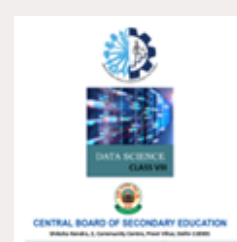
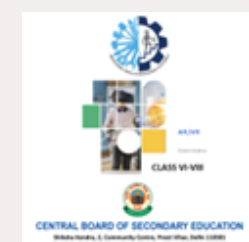
Handicrafts

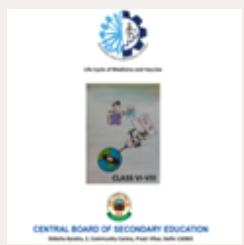
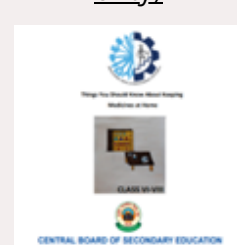
Information Technology

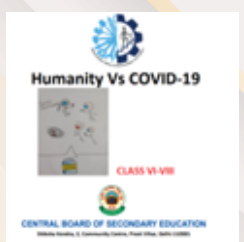
Marketing/Commercial Application

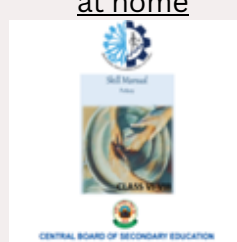
Mass Media - Being Media Literate

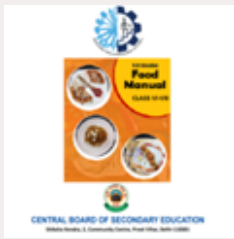
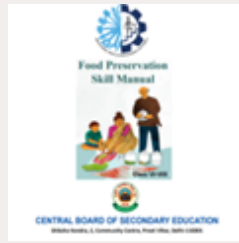
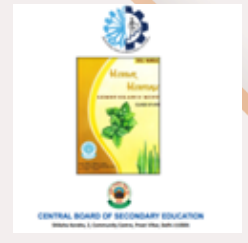
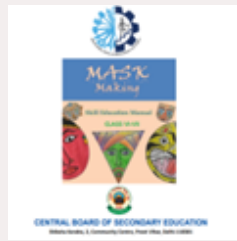
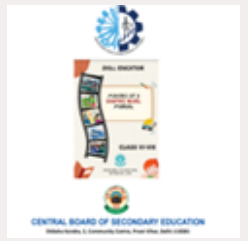
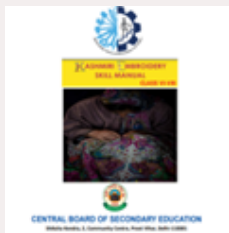
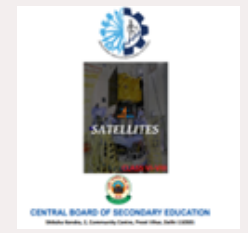
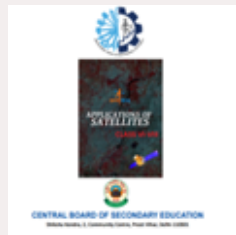
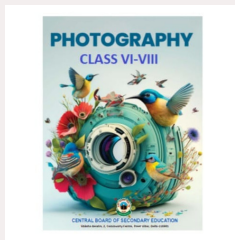
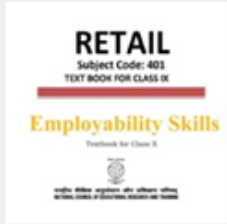
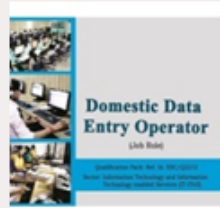
Travel & Tourism

Coding

Data Science (Class VIII only)

Augmented Reality / Virtual Reality

Digital Citizenship

Life Cycle of Medicine & Vaccine

Things you should know about keeping Medicines at home

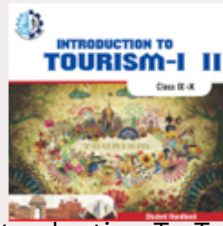
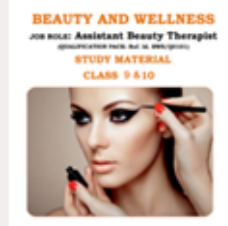
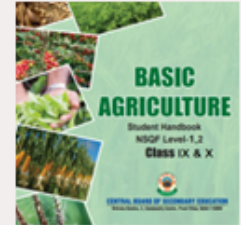
What to do when Doctor is not around

Humanity & Covid-19

Blue Pottery

Pottery

Block Printing

SKILL SUBJECTS AT SECONDARY LEVEL (CLASSES IX – X)

Retail

Information Technology

Security

Automotive

Introduction To Financial Markets

Introduction To Tourism

Beauty & Wellness

Agriculture

Food Production

Front Office Operations

Banking & Insurance

Marketing & Sales

Health Care

Apparel

Multi Media

Multi Skill Foundation Course

Artificial Intelligence

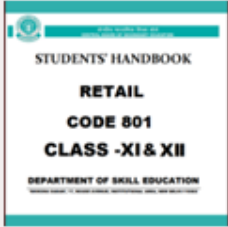
Physical Activity Trainer

Data Science

Electronics & Hardware (NEW)

Foundation Skills For Sciences (Pharmaceutical & Biotechnology)(NEW)

Design Thinking & Innovation (NEW)

SKILL SUBJECTS AT SR. SEC. LEVEL (CLASSES XI – XII)

Retail

InformationTechnology

Web Application

Automotive

Financial Markets Management

Tourism

Beauty & Wellness

Agriculture

Food Production

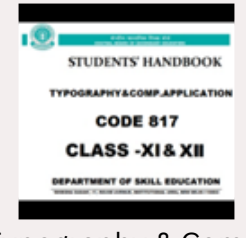
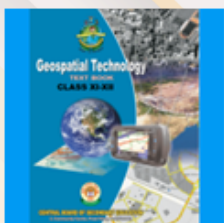
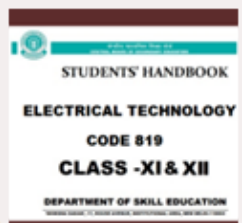
Front Office Operations

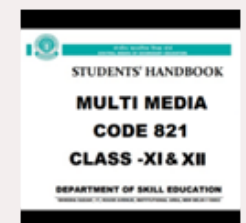
Banking

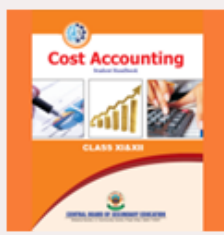
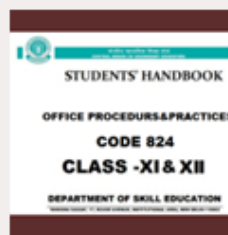
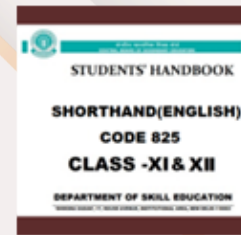
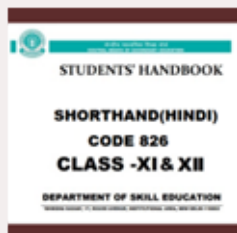
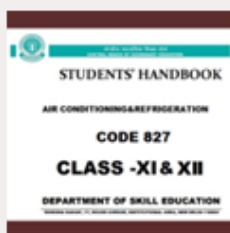
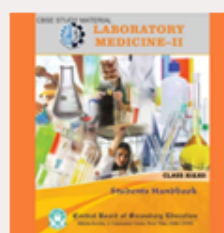
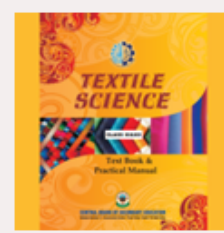
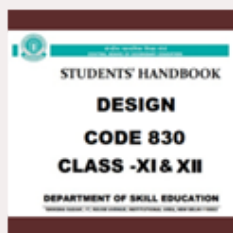
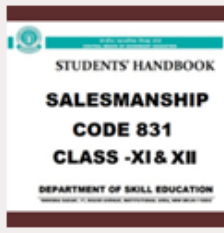
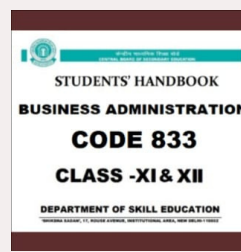
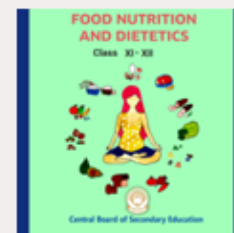
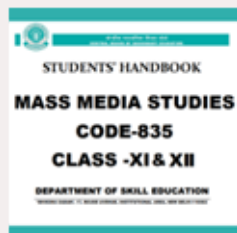
Marketing

Health Care

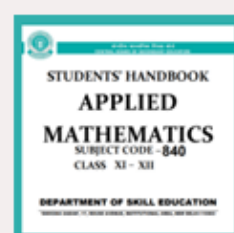
Insurance

Horticulture

Typography & Comp. Application

Geospatial Technology

Electrical Technology

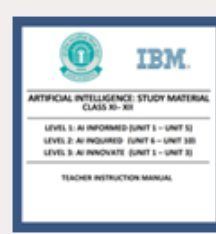
Electronic Technology

Multi-Media

Taxation

Cost Accounting

Office Procedures & Practices

Shorthand (English)

Shorthand (Hindi)

Air-Conditioning & Refrigeration

Medical Diagnostics

Textile Design

Design

Salesmanship

Business Administration

Food Nutrition & Dietetics

Mass Media Studies

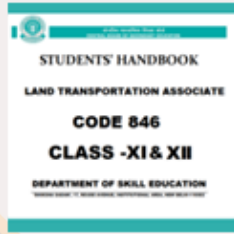
Library & Information Science

Fashion Studies

Applied Mathematics

Yoga

Early Childhood Care & Education

Artificial Intelligence

Data Science

Physical Activity Trainer(new)

Land Transportation Associate (NEW)

Electronics & Hardware (NEW)

Design Thinking & Innovation (NEW)